

# Serum Lipoprotein (a) Levels in acute Myocardial Infarction

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## ABSTRACT

**Background:** Increased lipoprotein (a) (Lp (a)) concentration was reported to be an independent risk factor for coronary heart disease (CHD). This study was performed to determine the level of Lp(a) and other lipids in patients with acute myocardial infarction. **Methods:** A total number of 90 cases were studied admitted to coronary care unit (CCU) for acute myocardial infarction (MI) and 60 healthy subjects. Data collection comprised Lp (a), total cholesterol, LDL-cholesterol (LDL-C), HDL-cholesterol (HDL-C) level and medical history. **Results:** Mean value of Lipoprotein (a) was 53.3 in Myocardial Infarction patients, compared to mean of 13.4 of the healthy subjects, which was significantly different with p value of 0.001. Mean value of Total cholesterol was 153.3 in Myocardial Infarction patients, compared to mean of 144.5 of the healthy subjects. Mean value of HDL was 37.6 in Myocardial Infarction patients, compared to mean of 35.4 of the healthy subjects. Mean value of LDL was 31.7 in Myocardial Infarction patients, compared to mean of 30.3 of the healthy subjects, which was significantly different with p value of 0.009. Mean value of VLDL was 29.5 in Myocardial Infarction patients, compared to mean of 13.4 of the healthy subjects. Mean value of Triglycerides was 128.4 in Myocardial Infarction patients, compared to mean of 138.3 of the healthy subjects. This study shows that average Lp(a) level in patients with acute MI is higher than control patients. Selective screening for primary and secondary prevention should be considered for high - risk patients. **Conclusion:** We recommend complementary epidemiologic study to evaluate this finding.

**Keywords:** lipoprotein (a), acute myocardial infarction, cholesterol.

## INTRODUCTION

Developing countries, especially countries like India are on the verge of twin epidemics of communicable diseases and non-communicable diseases. The prevalence of coronary artery disease is high amongst Indians 2.2 to 5 times for myocardial infarction, 1.5 to 3.0 times for coronary heart disease mortality. Myocardial infarction also occurs at a younger age in Indians.<sup>[1]</sup>

The disease pattern is severe. CAD is affecting Indians 5-10 years earlier than other communities. Indians also show higher incidence of hospitalization, morbidity, and mortality than other ethnic groups. This global phenomenon of severity suggests that the disease starts at an early age and has a malignant and progressive course.<sup>[2]</sup>

In Indian patients with CAD, high triglyceride levels are found more often than high cholesterol levels. Triglycerides bring change in LDL particle size, density, distribution, and composition producing smaller, denser and more atherogenic particles.<sup>[3,4]</sup>

Lipoprotein-a (Lp-a) is also recognized as an independent risk factor for CAD. It has a genetic risk factor. In Indians, both in India and abroad, the levels of Lp-a are higher as compared to the whites in Great Britain, suggesting a genetic propensity.<sup>[5]</sup> Lp-a level above 30 mg/dl are associated with three-fold higher risk of CAD. Lp-a levels over 40 mg/dl increases the risk associated with cigarette smoking by 1.9 times, with hypertension by 4.6 times, with high total cholesterol by 4.2 times, the risk associated with DM by 3.4 times, with high total Cholesterol / HDL ratio by 6.9 times, and with hyper-homocysteinaemia by 9.3 times.<sup>[2,7-9]</sup>

There are very few studies in India which establish the role of Lp(a) with the increasing risk of Myocardial infarction. In the above context, this study explored the utility and function of Lp (a) levels in young (<40 years) patients with myocardial infarction.

## MATERIALS AND METHODS

A comparative study of 90 patients with Acute Myocardial infarction were undertaken at Shri B M Patil Medical College, Hospital and Research center, Vijayapura during the period of June 2016 to October 2018. Age and sex matched 60 controls also

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included individuals without Ischemic heart disease for comparison.

Patient above 18 years of age with symptoms of Ischemia with detection of Cardiac biomarkers were included while patients of age less than 20 years, Stable Angina and Unstable Angina, and Cardiovascular diseases resembling MI like pericarditis, aortic dissection were excluded.

All characteristics were summarized descriptively. For continuous variables, the summary statistics of mean, standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries. Chi-square ( $\chi^2$ )/ Freeman-Halton Fisher exact test was employed to determine the significance of differences between groups for categorical data. The difference of the means of analysis variables between two independent groups was tested by unpaired t test. If the p-value was  $< 0.05$ , then the results were considered to be statistically significant otherwise it was considered as not statistically significant. Data were analyzed using SPSS software v.23.0. and Microsoft office 2007.

## RESULTS

Among 90 cases 56.7% were male and female 43.3%. The youngest patient in the study was 30

years old and the oldest was 84 years old with mean age of 58.5 years among cases and 52.6 among controls. Among all males and females majority were from more than 60 years age group. Patients with Chest pain with (87.7%) were predominant followed by breathlessness (63.3%) and 59.9% associated with sweating. 86.6% of patients presented with significant ECG changes, (New significant ST-segment T-wave (ST-T) changes i.e.,  $\geq 2$  mm rise in 2 consecutive leads). 93.3 percentage of them had elevated Troponin T / I biomarkers, while 76.6% had elevated CPK MB levels.

**Table 1: Cardiac Biomarker Detection**

Biomarker	No of cases	Percentage
Troponin I / T	84	93.3
CPK – MB	69	76.6

**Table 2: Comparison Of Mean Lp(A) Between Casesand Controls**

Parameter	Cases		Controls		p value
	Mean	SD	Mean	SD	
Lp(a)	53.3	18.1	13.4	8.4	<0.001*
Sr Triglycerides	128.4	44.4	138.3	67.8	0.286
Total Cholesterol	153.3	40.9	144.5	44.3	0.216
HDL	37.6	14.1	35.4	11.4	0.31
LDL	97.2	31.7	83.4	30.3	0.009*
VLDL	29.5	18.9	27.0	13.4	0.374

Note: \* significant at 5% level of significance (p<0.05)

**Table 3: Comparision OD Lipid Levels between Males and Females with Myocardial Infarction**

SEX	AGE Group	Lp(a)	TC	TGL	HDL	LDL	VLDL
Males	18-39 yrs	72 $\pm$ 25.55	162.7 $\pm$ 23.4	140 $\pm$ 61.4	36.67 $\pm$ 11.24	80.33 $\pm$ 40.1	27 $\pm$ 13
	40-60	55.7 $\pm$ 12.8	161.1 $\pm$ 47.3	133.2 $\pm$ 54.6	36.7 $\pm$ 16.6	36.78 $\pm$ 16.6	34.04 $\pm$ 26.8
	>60	68.3 $\pm$ 13.1	153.1 $\pm$ 45.6	139.6 $\pm$ 38.8	39.6 $\pm$ 13.9	95.9 $\pm$ 38.5	30.4 $\pm$ 13.3
Females	18-39 yrs	35.87 $\pm$ 2.76	139.67 $\pm$ 43.01	121 $\pm$ 45.1	34 $\pm$ 5.66	111.7 $\pm$ 5.23	24.1 $\pm$ 12
	40-60	34.9 $\pm$ 3.1	140.7 $\pm$ 42.1	123.6 $\pm$ 44.1	32.6 $\pm$ 11.1	88.9 $\pm$ 21.8	31.8 $\pm$ 6.5
	>60	41.4 $\pm$ 5.4	152.8 $\pm$ 30.3	114.1 $\pm$ 36.9	39.5 $\pm$ 14.4	98.2 $\pm$ 28.6	24.1 $\pm$ 9.4

According to table 2, Lipoprotein(a) was found significantly higher among MI cases (53.3 vs 13.4) compared to controls. Total cholesterol, HDL, LDL were also increased among cases while mean Sr Triglycerides was found decreased marginally among cases. In table number 3 Lipoprotein (a) was found significantly higher in higher ages compared to lower ages among both males and females.

## DISCUSSION

The mean value for Lp (a) levels was 53.3, which was significantly high with p value  $< 0.001$ .The mean of LDL was 97.2 with a p value of 0.009, which was highly significant. The mean value for total Cholesterol levels was 153.3, which had p value 0.216. The mean value for HDL levels was 37.6 , which had p value of 0.310.The mean value for VIDL levels was 29.5 , which had p value of 0.374. The mean value for Sr Triglycerides levels was 128.4, which had p value of 0.286.

J. H. Gorasia C. P. Kamariyaet. al.<sup>[6]</sup> also found that out of 50 patients diagnosed with AMI ( by Signs,

Symptoms, ECG and Bio-markers like CPK – MB & Trop-T ), who participated in the study, there was no significant changes in total cholesterol (P = 0.8192), or high density lipoprotein-cholesterol (HDL-C) (P = 0.11), triglyceride (P = 0.1177) levels, and total cholesterol / HDL cholesterol ratio (P = 0.2129) were observed between the case and control groups in this study . Concluding that, Lp (a) level is an important and Independent risk factor for CAD. Serum Lp (a) level is not dependent on serum total cholesterol level

Increased risk of MI was found with with increasing levels of Lipoprotein (a), similar to the the “The Copenhagen City Heart Study” conducted by P. R. Kamstrup, Marianne Benn, et.al.(114), where 9330 men and women from the general population were studied over a period of 10 years. Of these 498 participants developed AMI, where a stepwise increase in risk of MI with increasing levels of lipoprotein(a) was seen. And Extreme lipoprotein(a) levels predict a 3- to 4-fold increase in risk of MI.

In a study by M.Gómez, V.Valle, et. al.,<sup>[10]</sup> which was a multi-center cohort study that includes 1371

AMI patients who were admitted within 24 hours of symptom onset. The prevalence of AMI without classical risk factors was 8.0%, the only emergent risk factors independently associated with a poor prognosis was the Lp(a).

## CONCLUSION

These all data shows that only Lipoprotein (a) is found significantly (99.9 %) higher in compare to controls in patients of Myocardial infarction, while S. Cholesterol, S.HDL-Cholesterol of S.VLDL-Cholesterol, S.LDL-Cholesterol & S. Triglyceride level does not have any significant difference, which suggests Lipoprotein (a) as independent risk factor for Myocardial infarction among Indian patients thus may assist in the monitoring and management of such patients, at least in the first year of treatment.

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